Exhibit 2 Invention Disclosure

PATENT APPLICATION
ATTORNEY DOCKET NO. 200206465-1

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT: 2826 EXAMINER: Tan N. Tran APPLICANT: Ashton et al. SERIAL NO.: 10/673,003 FILED: September 26, 2003 CONFRM. NO.: 9774 **FOR:** ULTRA-HIGH DENSITY STORAGE DEVICE USING PHASE CHANGE DIODE MEMORY CELLS AND METHODS OF FABRICATION THEREOF DOCKET NO. 200206465-1	**RESPONSE/AMENDMENT** **CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8** DATE OF DEPOSIT: Aug 15, 05 I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being deposited with the United States Postal Service with sufficient postage as first class mail on the date indicated above and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. Vaughn W. North **Vaughn W. North**

DECLARATION OF ROBERT J. DAVIDSON
UNDER 37 C.F.R. § 1.131

Assistant Commissioner of Patent and Trademarks
Washington, D.C. 20231

I, Robert J. Davidson, declare as follows:

1. I am a named co-inventor in the above-captioned patent application and of the subject matter described and claimed therein.

2. The invention as described and claimed in the above-captioned US patent application No. 10/673,003 was conceived in the United States by myself and Gary R. Ashton, collaborating as co-inventors, prior to May 1, 2003, the effective date of the Chaiken '499 Published Patent Application.

3. Exhibit 2, attached hereto, is a redacted copy of the invention disclosure for the invention described and claimed in the above-captioned patent application that was prepared and signed by myself and Gary R. Ashton prior to May 1, 2003. Accordingly, Exhibit 2 shows that the invention described and claimed in the above-captioned patent application was conceived prior to the effective date of May 1, 2003 of the Chaiken 499 Published Patent Application.

4. The invention disclosure of Exhibit 2 was submitted to Hewlett Packard for the preparation and filing of the above-captioned patent application prior to May 1, 2003.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful, false statement may jeopardize the validity of the application or any patent issuing thereon.

DATED this 12th day of August, 2005.

Robert J. Davidson

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INVENTION DISCLOSURE

PAGE ONE OF ____

PDNO 200206465 DATE RCVD ATTORNEY AJB

HP BOISE LEGAL

*Instructions: The information contained in this document is **COMPANY CONFIDENTIAL** and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.*

Descriptive Title of Invention:
Using Copper Indium Gallium Selenide (CIGS) material as the phase change portion of an ARS media diode

Name of Project:
ORCA-ARS (Atomic Resolution Storage)

Product Name or Number:
None yet

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):
No

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):
No

Was the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s):
Rommel Noufi at NREL in Golden Colorado. At a future date.

If any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at 1-888-4919 or 970-898-4919.

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.)
NREL Teleconference and at ARS media team teleconference.

Was the invention built or tested? If so, the date:
In the planning stages of this. Partial test in Bob Davidson's laser system. Surface layer only – no diode tests. CIGS is a typical material made for solar cells. This invention pertains to CIGS's application as a phase change data storage material.

Was this invention made under a government contract? If so, the agency and contract number:
We do not know this for sure. We contracted with NREL (the government) to make some diode devices with this material as the substrate. The sample we tested used in the laser system was obtained from NREL under this contract.

Description of Invention: *Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).*

A. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)
B. Advantages of the invention over what has been done before.
C. Problems solved by the invention.
D. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on this date: [ ].

Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
524999	Gary R. Ashton	Gary R. Ashton	396-5323	400	4800 PSB
352142	Curtis Gonzales	Curtis Gonzales	3967121	400	4800 PSB
48788	Robert J. Davidson		396 2220	400	4800 PSB

(If more than four inventors, include additional information on another copy of this form and attach to this document)

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INVENTION DISCLOSURE COMPANY CONFIDENTIAL PAGE ____ OF ____

Signature of Witness(es): *(Please try to obtain the signature of the person(s) to whom invention was first disclosed.)*

The invention was first explained to, and understood by, me (us) on this date: [ ]

Full Name	Signature	Date of Signature
Richard Lee Hilton	Richard Lee Hilton	
Thomas Wayne Ives	Thomas Wayne Ives	

Inventor & Home Address Information: *(If more than four inventors, include addl. information on a copy of this form & attach to this document)*

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Greeted as *(nickname, middle name, etc.)*		Citizenship		

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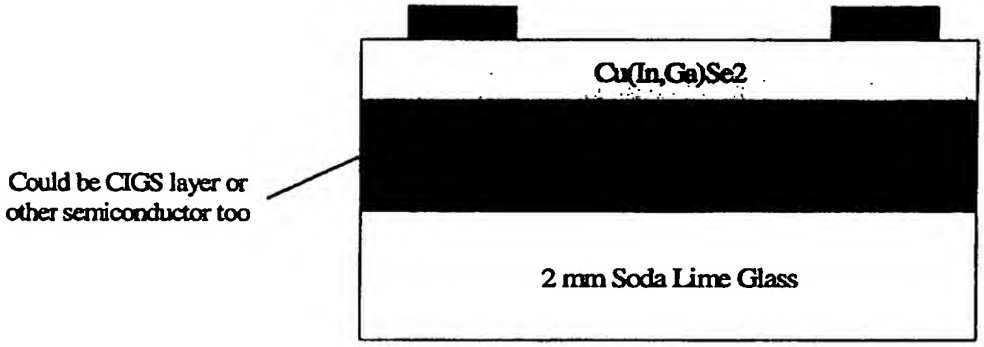
Description of Invention: *Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).*

A. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc

CIGS refers to "copper indium gallium disulfide" of formula Cu(In,Ga)Se_3. See High-efficiency $CuIn_xGa_{1-x}Se_2$ solar cells made from $(In_xGa_{1-x})_2Se_3$ precursor films in Applied Physics Letters, July 11, 1994, Volume 65, Issue 2, pp. 198-200. Also refer to HP invention disclosure: 100201669 - "ARS Diode Media Made Of Indium Selenide And Cu(In,Ga)Se2". We have demonstrated that a laser beam can write on the standard NREL CIGS composition and that is possible to cycle the written areas between amorphous and crystalline states. This leads to the idea that a diode as shown in invention disclosure 100201669 turned upside down can be used as the storage media in an ARS diode construction. Because it is no longer needed to store bits, other semiconductor materials can now replace the Indium Selenide layer in the diode shown in invention disclosure 100201669 as long as they produce"good" diodes for ARS media purposes.



B. Advantages of the invention over what has been done before

CIGS has better electrical properties than indium selenide. The replacement of indium selenide opens up a wider range of materials for the other part of the diode junction including CIGS doped in the opposite carrier type.

It appears that CIGS can be written on and cycled easier than indium selenide.

There are two novel ideas presented in this disclosure.

1. The use of CIGS material as a phase change data storage material; both using lasers and electrons as the heat source.
2. The diode structure using CIGS material to detect the written bit.

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C. Problems solved by the invention.
CIGS is easier to cycle in phase than indium selenide and has superior electrical properties for making diodes.

D. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

There have been many diodes made by HP in the ORCA program using indium selenide compounds for the phase change layer. These diodes and the indium selenide compounds have not worked as well as we would like. The diode electrical properties have not been good and the indium selenide phase change material has not been easy to write and cycle.